

## 2.4 Negative Exponents

Wednesday October 16, 2013

# Recall

What is a reciprocal?

- Two numbers with a product of 1 are reciprocals

Examples:

- Since  $4 \cdot \frac{1}{4} = 1$ , the numbers 4 and  $\frac{1}{4}$  are reciprocals.
- Since  $\frac{2}{3} \cdot \frac{3}{2} = 1$ , the numbers  $\frac{2}{3}$  and  $\frac{3}{2}$  are reciprocals

What would be the reciprocal of  $5^{-2}$ ?

We need to find a number that multiplied by  $5^{-2}$  will give us 1.

$$5^{-2} \times \underline{\hspace{1cm}} = 1$$

$5^{-2} \times 5^2 = 1$ , therefore the reciprocal is  $5^2$ .

$$\text{So, } 5^{-2} = \frac{1}{5^2} \text{ and } \frac{1}{5^{-2}} = 5^2$$

Why?

-we need to use exponent laws!

$$5^{-2+2} = 5^0 = 1$$

# Powers with Negative Exponents

## Powers with Negative Exponents

When  $x$  is any non-zero number and  $n$  is a rational number,  $x^{-n}$  is the reciprocal of  $x^n$ .

That is,  $x^{-n} = \frac{1}{x^n}$  and  $\frac{1}{x^{-n}} = x^n$ ,  $x \neq 0$

# Powers with Negative Integer Exponents

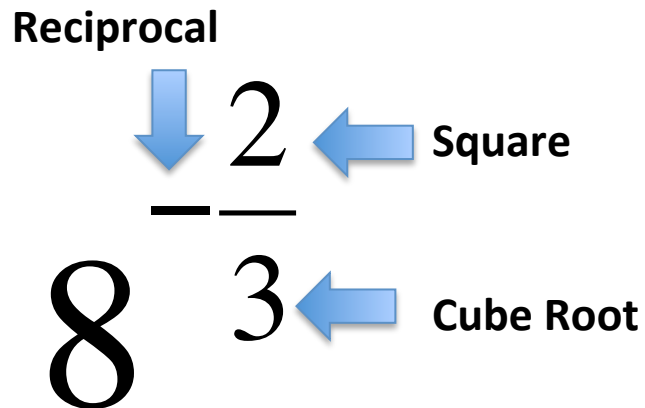
**1.** Evaluate each power.

**a)**  $7^{-2}$

**b)**  $\left(\frac{10}{3}\right)^{-3}$

# Powers with Negative Rational Exponents

- The same rules apply for negative rational exponents.
- For example, the rational exponent in the power  $8^{-\frac{2}{3}}$  indicates the following operations



Now, let's evaluate  $8^{-\frac{2}{3}}$

Step 1: Write with positive exponent

Step 2: Take the cube root

Step 3: Square the result

**2.** Evaluate each power without using a calculator.

**a)**  $16^{-\frac{5}{4}}$

**b)**  $\left(\frac{25}{36}\right)^{-\frac{1}{2}}$



# Practice

- Pg 233

3, 5, 6, 7, 8, 9 (a, c, e, g)